

**PART A: MULTIPLE CHOICE (10 MARKS)**

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

1. A passenger on a bus walks towards the front of the bus at 3.0 km/h relative to the bus, while the bus travels south at 15 km/h. The passenger's velocity relative to the road is:  
(a) 18 km/h[N] (b) 18 km/h[S]  
(c) 12 km/h[N] (d) 12 km/h[S]
2. Which of the following motions is not uniform?  
(a) A satellite in orbit around the Earth.  
(b) A ball rolls along a table without changing velocity.  
(c) A jogger runs 50 m along a straight track at a constant speed.  
(d) An elevator moves vertically upward at zero acceleration.
3. A scalar quantity is one which does not have a:  
(a) numeral (b) unit  
(c) direction (d) displacement
4. Which of the following includes an example of a vector quantity?  
(a) Juanita walks 2 km north to get water.  
(b) The density of aluminum is 2700 kg/m<sup>3</sup>.  
(c) A jogger runs 3 km around the track.  
(d) Grimsby is 24 km from Hamilton.
5. A car located 150 km[W] of Toronto travels to a point 400 km[W] of Toronto. The resultant displacement of the car is:  
(a) 250 km (b) 250 km[W]  
(c) 550 km (d) 550 km[W]
6. An athlete completes two laps of a circular track of circumference 100 m. At the end of the run the athlete's total distance travelled is:  
(a) 0 m (b) 50.0 m  
(c) 100 m (d) 200 m
7. A bear searching for food walks 15 km[E], 5.0 km[S], 3.0 km[W], and 5.0 km[N]. The bear's resultant displacement is:  
(a) 12 km (b) 12 km[E]  
(c) 28 km (d) 28 km[E]
8. A ball rolls 3.0 m[S], stops and then rolls 4.0 m[W]. The resultant displacement of the ball is:  
(a) 7.0 m[S37°W]  
(b) 7.0 m[S53°W]  
(c) 5.0 m[S37°W]  
(d) 5.0 m[S53°W]
9. A car travels 4.0 km[N] and then 3.0 km[S]. If the total trip requires 15 min, the average speed of the car for the trip is:  
(a) 4.0 km/h (b) 4.0 km/h[N]  
(c) 28 km/h (d) 28 km/h[N]
10. An object travels  $6.0 \times 10^4$  m with a uniform speed of  $1.5 \times 10^3$  m/s. The time it takes is:  
(a)  $4.0 \times 10^{-1}$  s (b) 2.5 s  
(c)  $4.0 \times 10^1$  s (d)  $4.0 \times 10^7$  s

**PART B: MATCH (5 MARKS)**

Match the definition from the 1<sup>st</sup> column to the best term in the 2<sup>nd</sup> column and place the matching letter in the appropriate space on your answer sheet.

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|---|----------------------|
| 1. Total displacement of an object per unit time  | A) displacement      |
| 2. Location of object relative to reference point.                                      | B) distance          |
| 3. Quantity that has magnitude, but no direction.                                       | C) nonuniform motion |
| 4. Total length of path travelled by an object as it moves from one position to another | D) position          |
| 5. Type of motion that involves a constant speed in a straight line.                    | E) scalar quantity   |
|   | F) speed             |
|   | G) ticker tape timer |
|   | H) uniform motion    |
|   | I) vector quantity   |
|   | J) velocity          |

**PART A: MULTIPLE CHOICE (10 MARKS)**

1	2	3	4	5	6	7	8	9	10
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**PART B: MATCH (5 MARKS)**

1	2	3	4	5
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**PART C: SHORT ANSWER (10 MARKS)**

Answer the following questions in the space provided.

- {4} 1. Classify the following as (S) scalar or (V) vector quantities.
- {6} 2. A marathon runner in training runs 5.0 km[S] and then 18 km[N]. Assume the entire run takes 1.3 h.

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|---------------------|---|
| (a) 12 m/s[N] _____ | (a) What is the total displacement for the run? _____ |
| (b) 40 min _____    | (b) What is the average velocity? _____               |
| (c) 4.2 km _____    | (c) What is the total distance travelled? _____       |
| (d) 5.5 N[S] _____  | (d) What is the average speed? _____                  |

**PART D: PROBLEMS (25 MARKS)**

Answer the following questions on a separate sheet of paper. You may use the back of this sheet if you wish.

1. Helen starts from home and walks in a straight line 140 m[W] to a friend's house. Helen and her friend then walk 65 m[E] on the same sidewalk to school.
- {3} (a) Draw a diagram showing the (i) position vectors and (ii) resultant displacement vector in this situation.
- {3} (b) Determine Helen's total distance and total displacement.
2. A dog, initially sitting next to its owner, runs first to a position 2.8 m[W] of its owner, and then secondly to a position 12.6 m[E] of its owner.
- {3} (a) Draw a diagram showing the (i) position vectors and (ii) resultant displacement vector in this situation.
- {3} (b) Determine the dog's total distance and total displacement.
3. A jogger takes 3.5 min to run once around a square city block that is 220 m on each side.
- {2} (a) Draw a sketch of the motion.
- {2} (b) Determine the jogger's average speed in m/s.
- {2} (c) Determine the jogger's average velocity upon returning to the starting position?
- {7} 4. R.R. Hood is travelling to visit her grandmother. First, she travels at an average speed of 12 km/h for 10 km. Then she travels at 8.0 km/h for another 1.25 h. Calculate her average speed for the entire trip to grandma's house? (Don't worry about the return trip - she catches a ride with B.B. Wolf)